Monitoring the Habitat Requirements of the Eastern Box Turtle (*Terrapene carolina carolina)* in Relation to the Training Areas of Camp Edwards at the Massachusetts Military Reservation

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Range Control

Who?

David Cray
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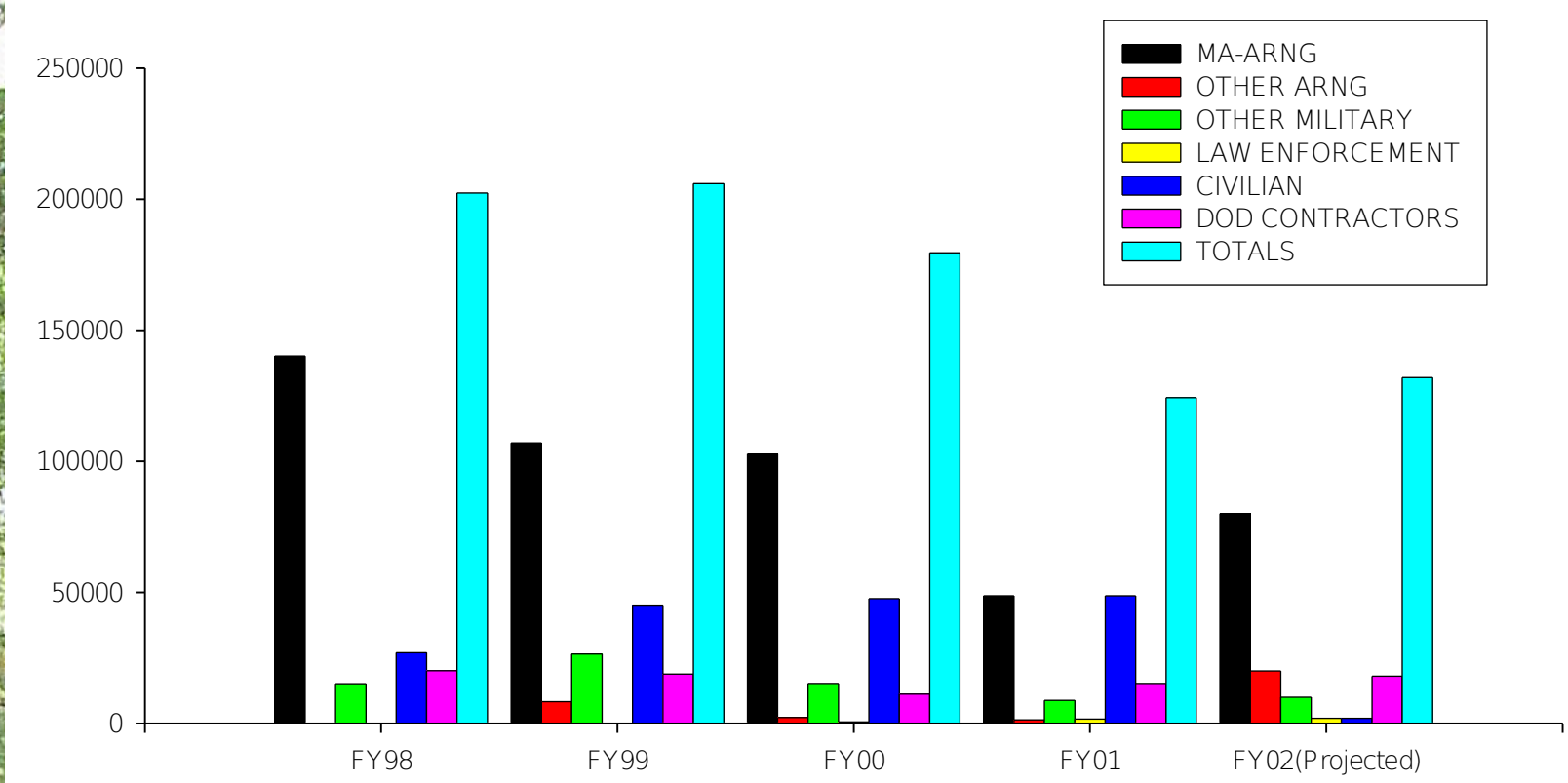
John P. Kelly
Natural Resource Planner/Pest Management Co
Massachusetts Army National Guard

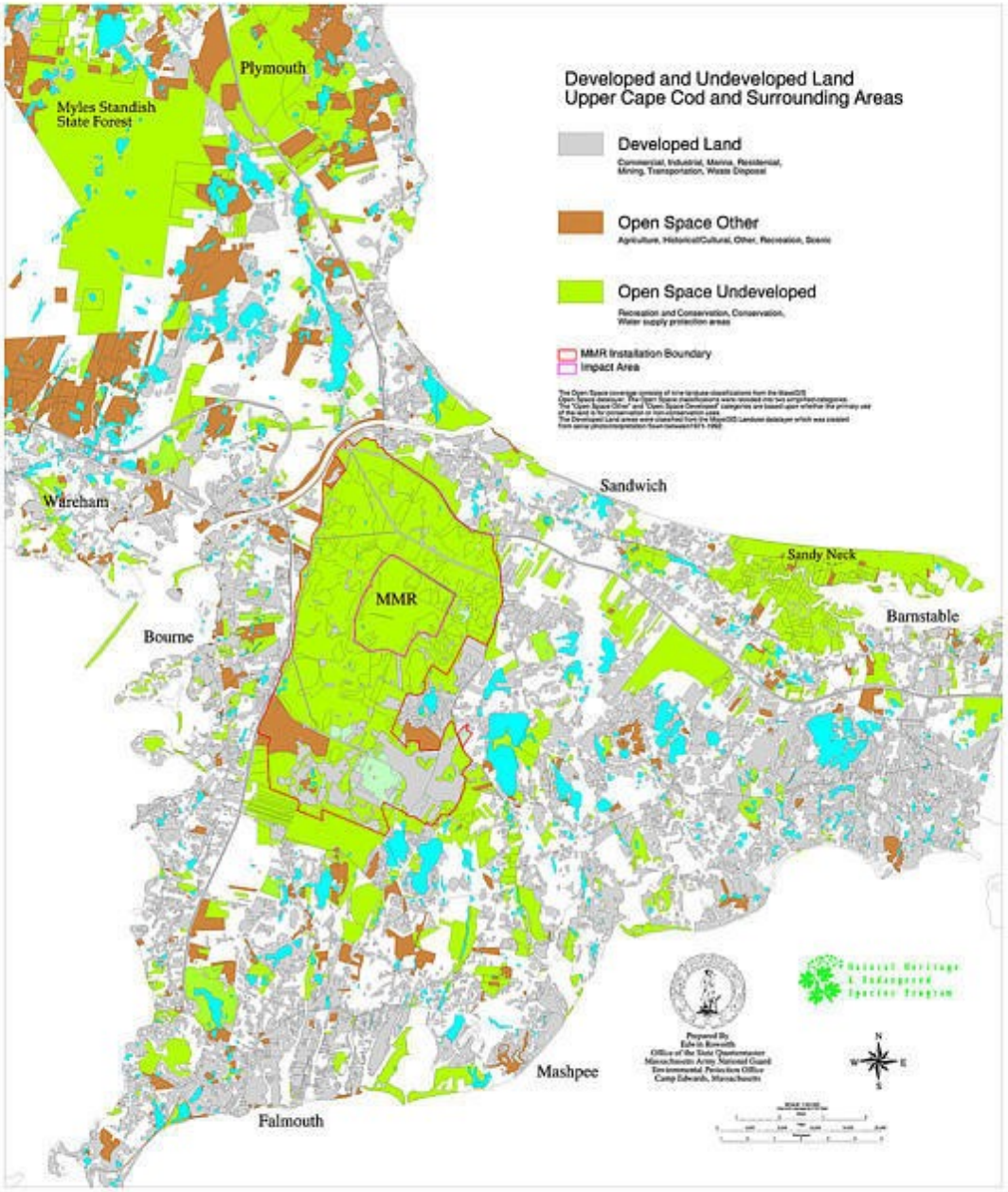
We are here

Why is Camp Edwards Important to Training?

Troop Numbers 1998 - 2002



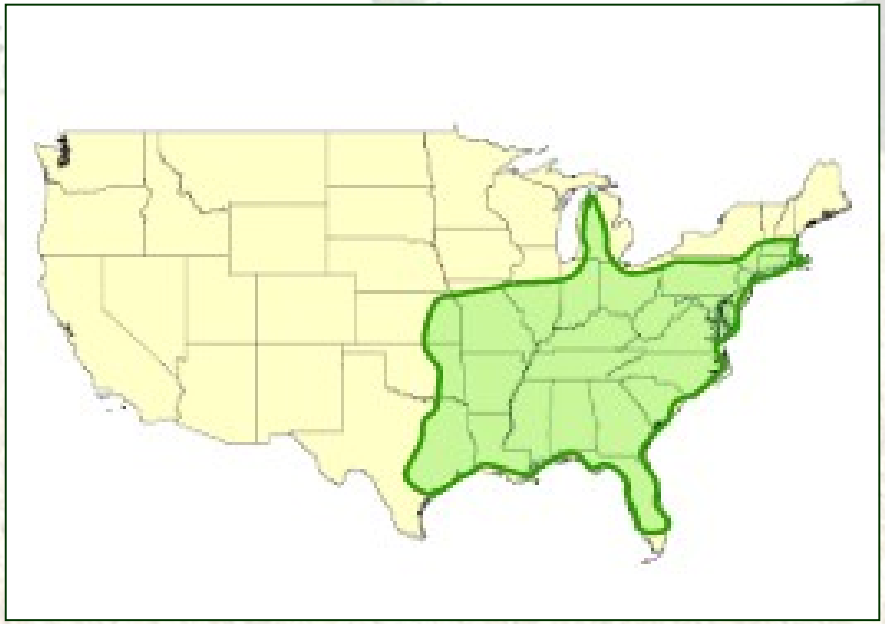
Why?


Developed and Undeveloped Land
Upper Cape Cod and Surrounding Areas
Developed Land
Commercial, Industrial, Marina, Residential, Mining, Transportation, Waste Disposal
Open Space Other
Agriculture, Historical/Cultural, Other, Recreation, Scenic
Open Space Undeveloped
Recreation and Conservation, Conservation, Water supply protection areas
MMR Installation Boundary
Impact Area
Plymouth
Myles Standish State Forest
Wareham
Bourne
MMR
Sandwich
Sandy Neck
Barnstable
Mashpee
Falmouth
Natural Heritage & Endangered Species Program
Prepared By
Edwin Ecworth
Office of the State Quartermaster
Massachusetts Army National Guard
Environmental Protection Office
Camp Edwards, Massachusetts
N
W
E
S
Data provided by
MASSGIS

Natural Histor

Range:

Southern Maine to the Florida Keys, west
Michigan, Kansas, and Texas



Breeding:

- Nest May to July
- 3-8 eggs
- Females can store sperm and lay eggs for several years after a single mating

Food Habits:

Omnivorous- slugs, earthworms, animal carcas
wild berries, mushrooms

Habitat:

Moist forested areas, wet meadows, pastures and floodplains

Objectives:

- Microhabitat selection
- Thermal ecology of hibernation
- Population survey
- Daily movements and home ranges
- Develop habitat models
- Training

Microhabitat Selection

- Locate turtles da
  - Radio telemetry
  - 5 Females
  - 5 Males

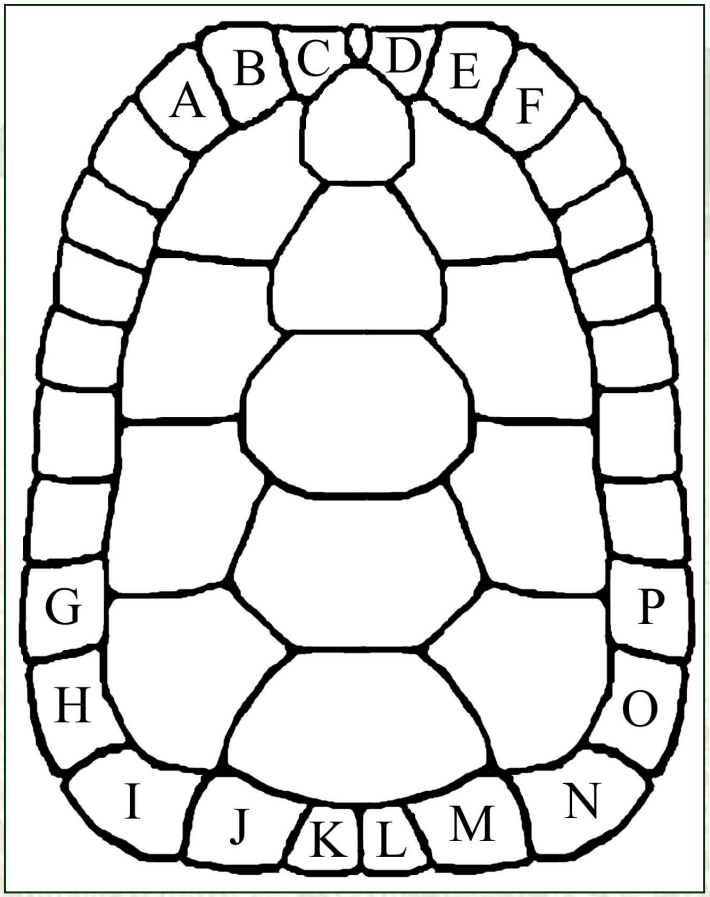
Microhabitat Selection

- Locate turtles daily
- Record microhabitat characteristi
  - **temperature (°C)**
  - **relative humidity (%)**
  - **light level (lux)**
  - **canopy cover (%)**
  - **Slope**
  - **aspect**
  - **soil pH**
  - **soil moisture**
  - **leaf litter depth**
  - **plant species**

Microhabitat Selection

- Compare to microhabitat at a random location
  - center of home range
  - random distance and bearing

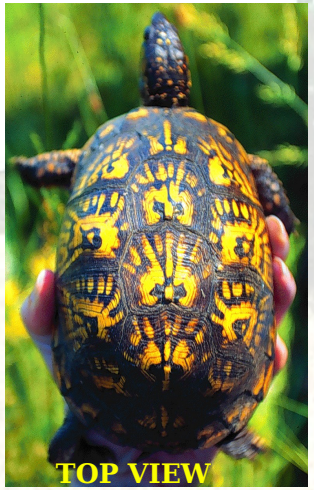
Population Survey



WANTED

BOX TURTLE SIGHTINGS

SIDE/FRONT VIEW



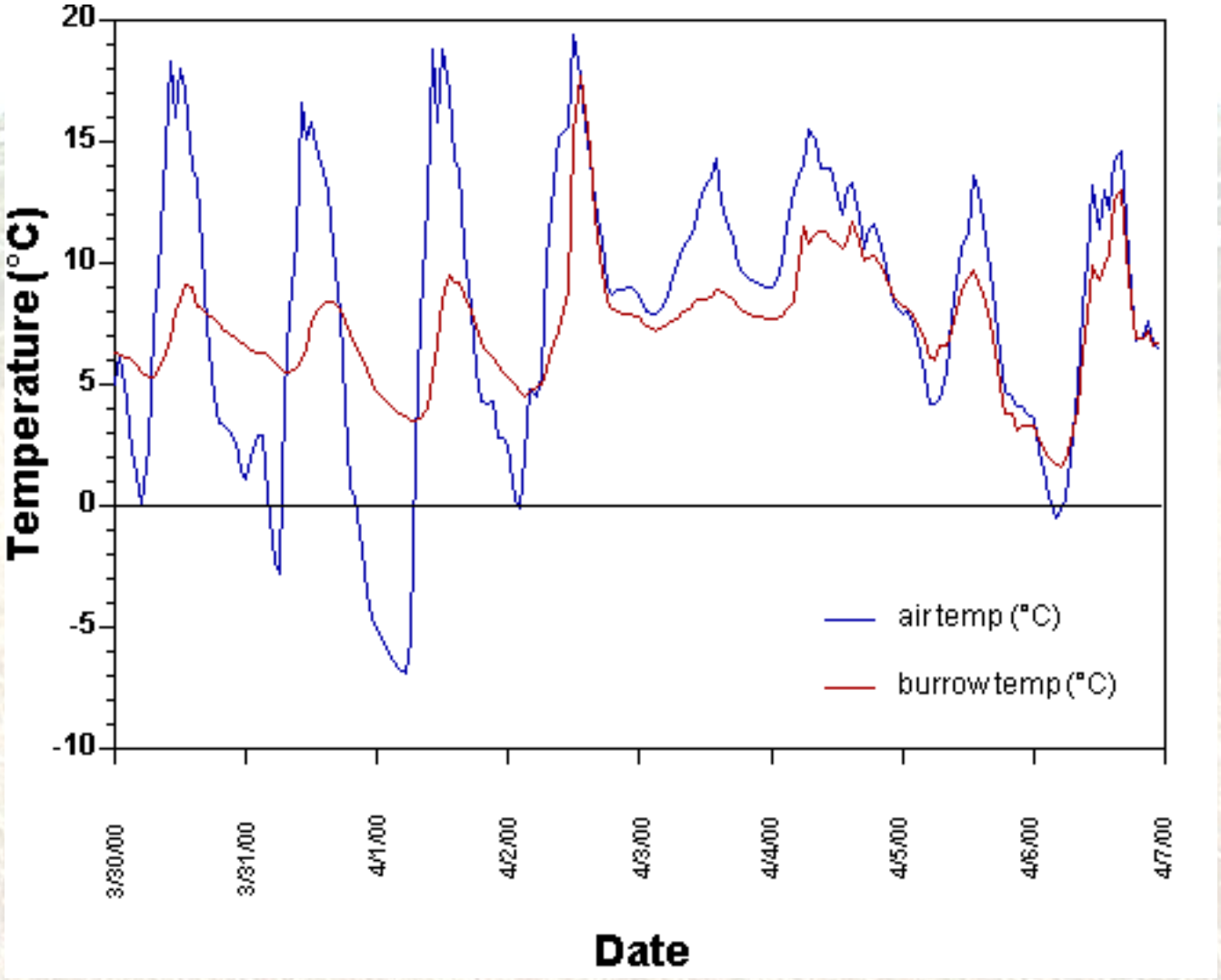
TOP VIEW

- The Eastern Box Turtle (*Terrapene carolina*) is a Species of Special Concern in Massachusetts and is protected under the State's Endangered Species Act.
- Box turtles may be identified by their distinctive dome-shaped shells, which are often colored a mixture of black or brown, and yellow or orange.
- To better understand the ecology of these turtles the Camp Edwards Environmental Office is trying to identify the distribution of these turtles on the MMR.
- The success of this project depends on the involvement of people like you.
- **If you see a box turtle (living or dead) on the MMR please call 968-5121 as soon as possible so that we may observe it. If you cannot get to a phone right away, please record the date, time, and location, and call us at a later time.**

Certificate of Appreciation
FOR
OUTSTANDING
BOX TURTLE OBSERVATION
presented to
Pete Dillon
7 AUGUST 2008 NORTH OF L RANGE

Thermal Ecology of Hiber

Turtle Emergence Da



Daily Movement and Home Ranges

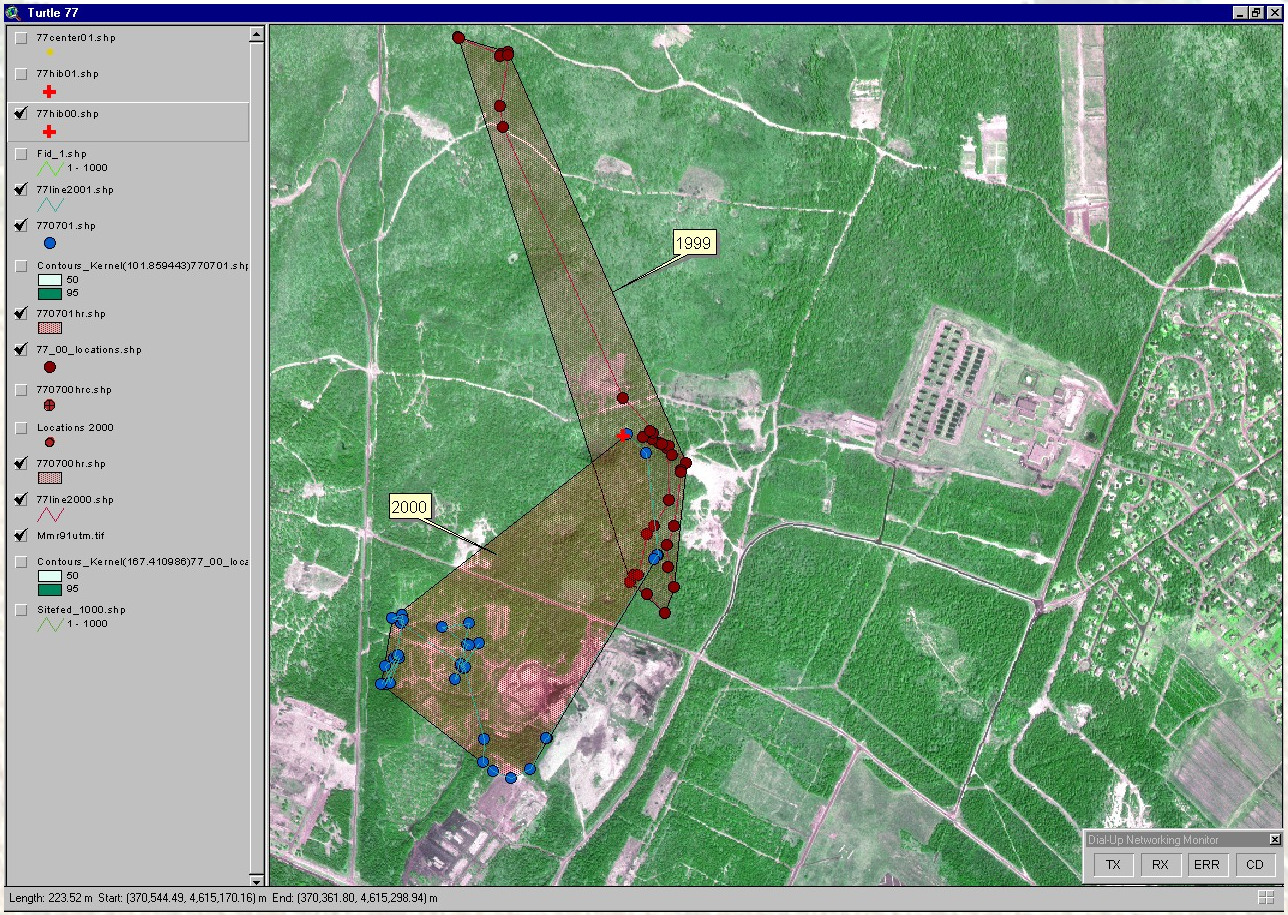
- Record location using GPS

- GIS Work
  - Turtle Home Ranges
  - Turtle Site Fidelity
  - Model Creation
    - Macro Habitat
    - Micro Habitat
  - Compare Camp Edwards to Cape C

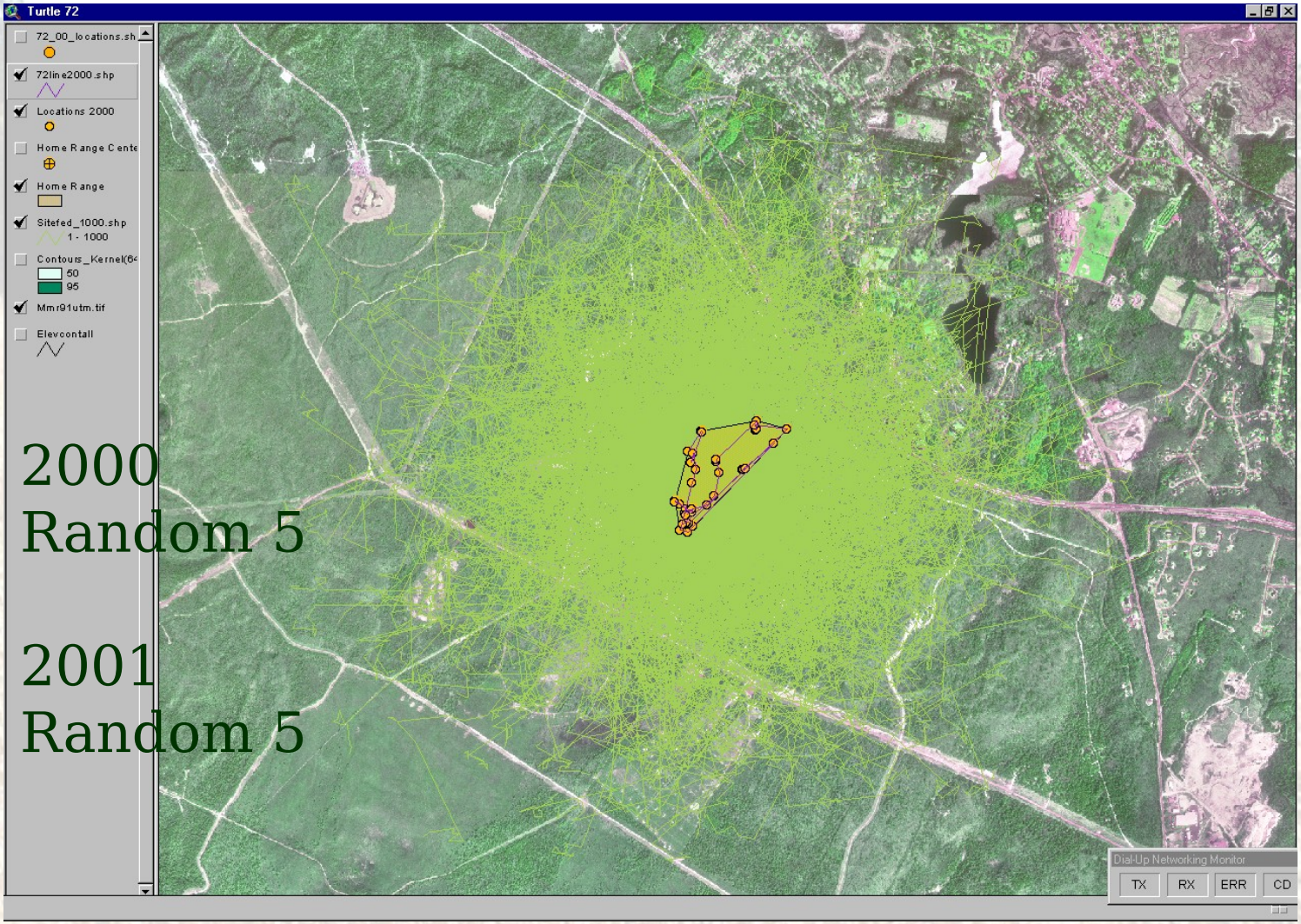
Used the GIS and GPS information to Calculate

- Home Range (2 ways MCP and Kernel/Probab

MCP = 8.8 ha(1.3-44.3 ha) Kernel = 12.8 ha (1.

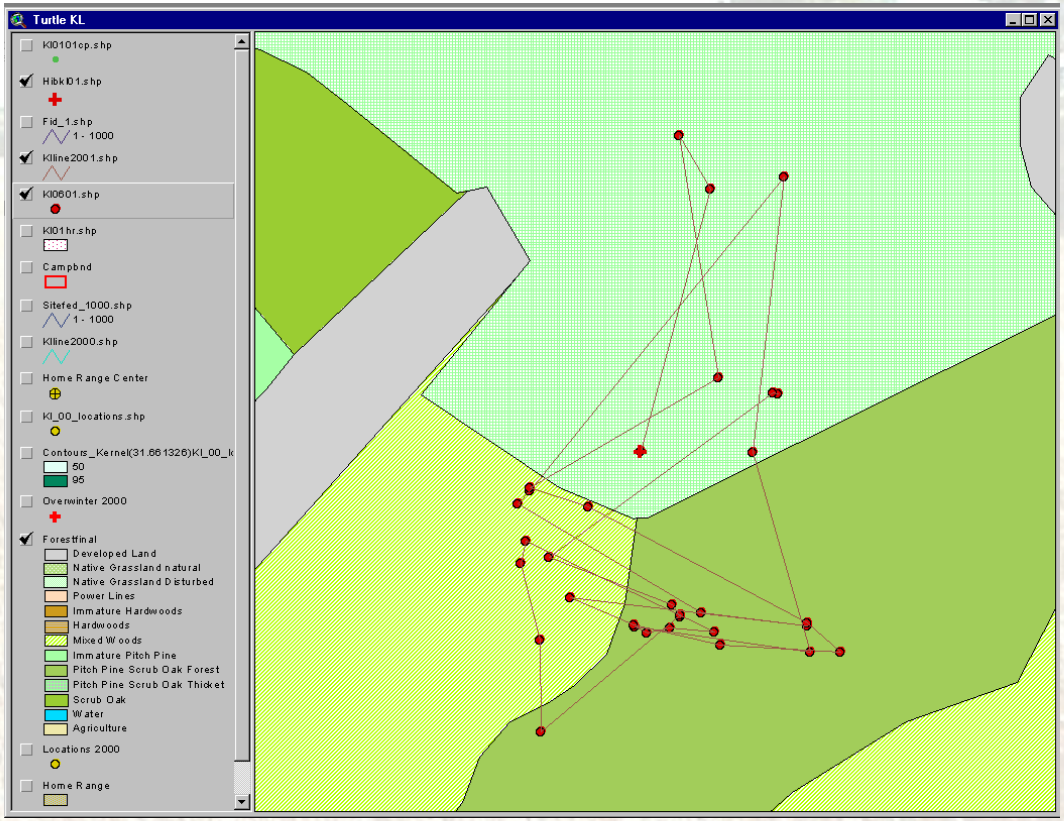


- Site Fidelity Analysis for each turtl
- Measure of Randomness



- We know, from the Turtle Study, the locations f
  for 2 years around our base.

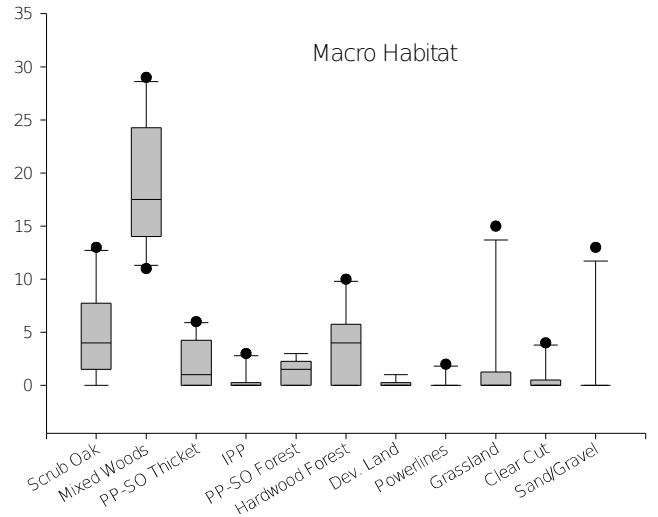
- We know what Forest Types they occurred in.



Therefore, we know the most selected Forest Ty

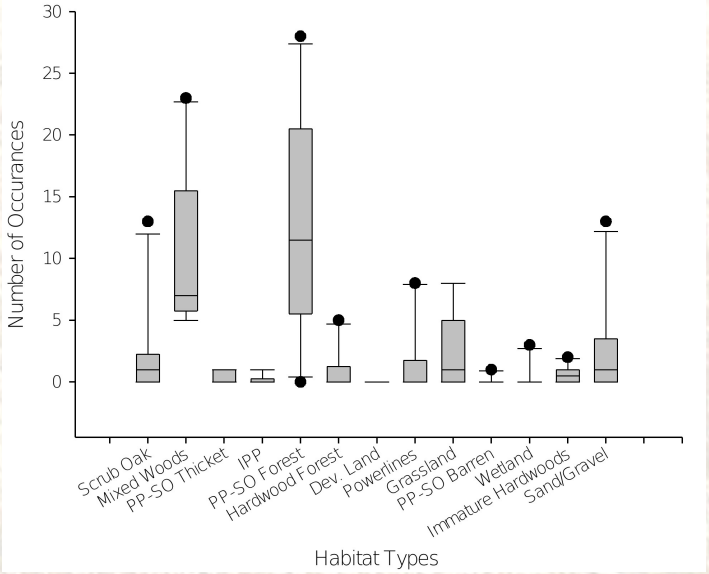
Reclassified GIS Data 2000

Mixed woods = 8
Scrub Oak = 7
Hardwood Forest = 6
PP-SO Thicket = 5
PP-SO Forest = 4
Grassland = 3
Powerlines = 2
DL, SG, CC, IPP = 1

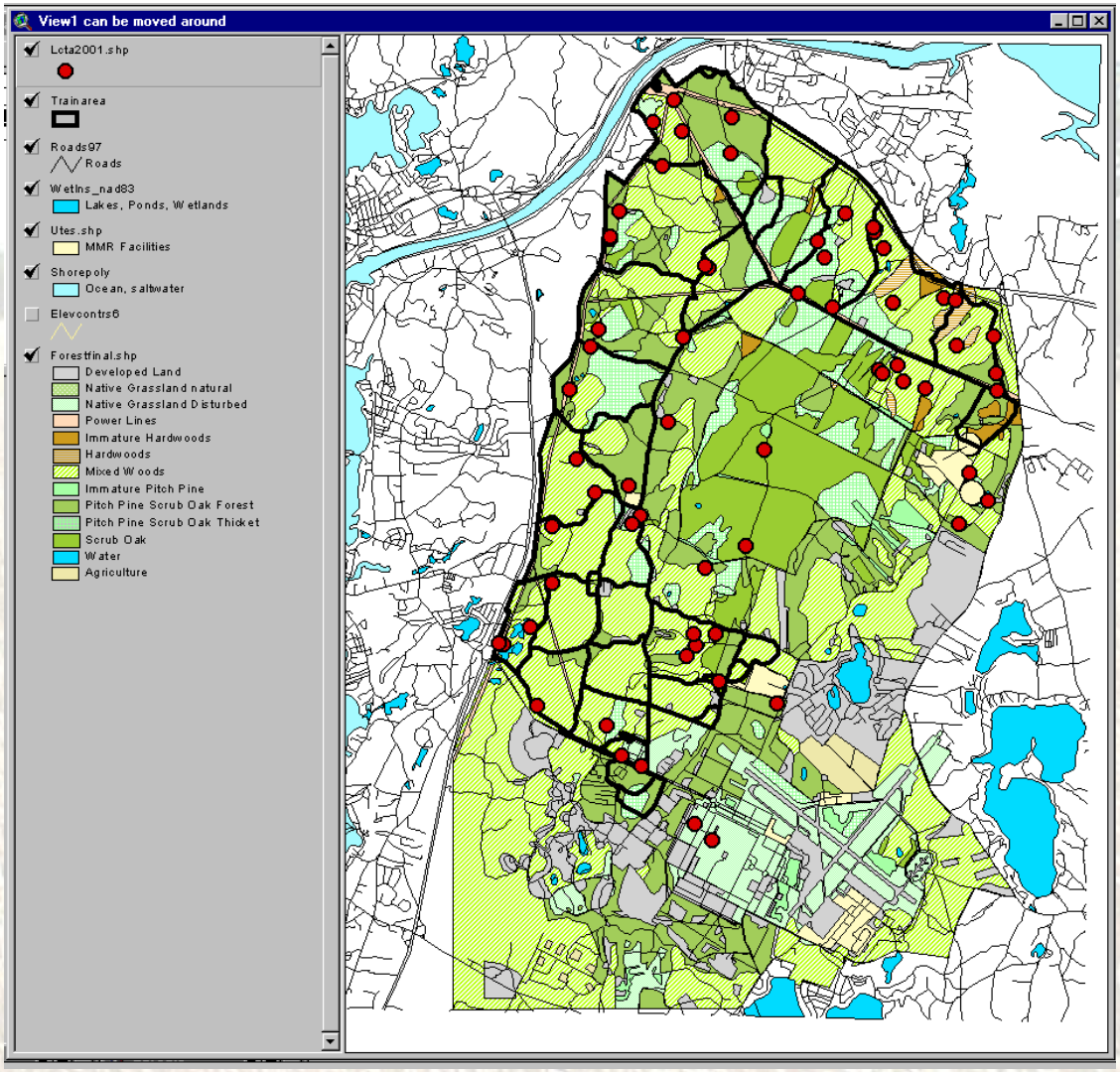


Reclassified GIS Data 2001

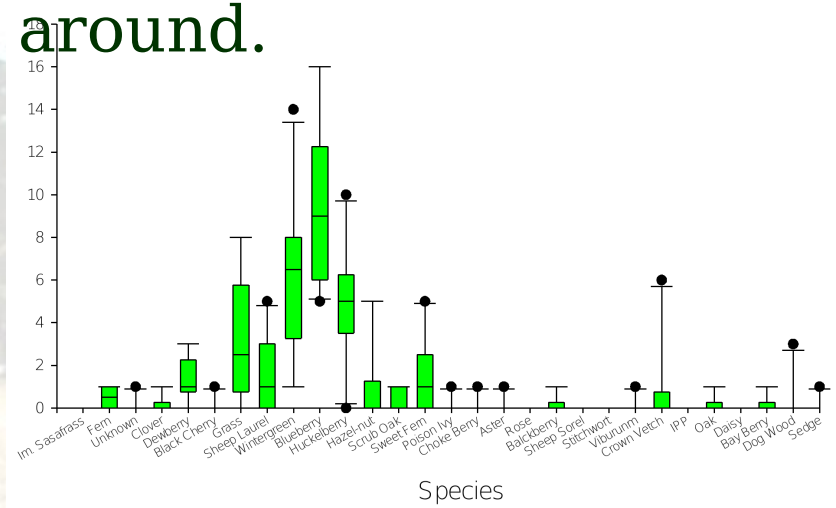
PP-SO Forest = 8
Mixed Woods = 7
Grassland = 6
Sand/Gravel = 5
Scrub Oak = 4
Powerlines = 3
Hardwood Forest = 2
DL, IPP, PPSOT, WL = 1

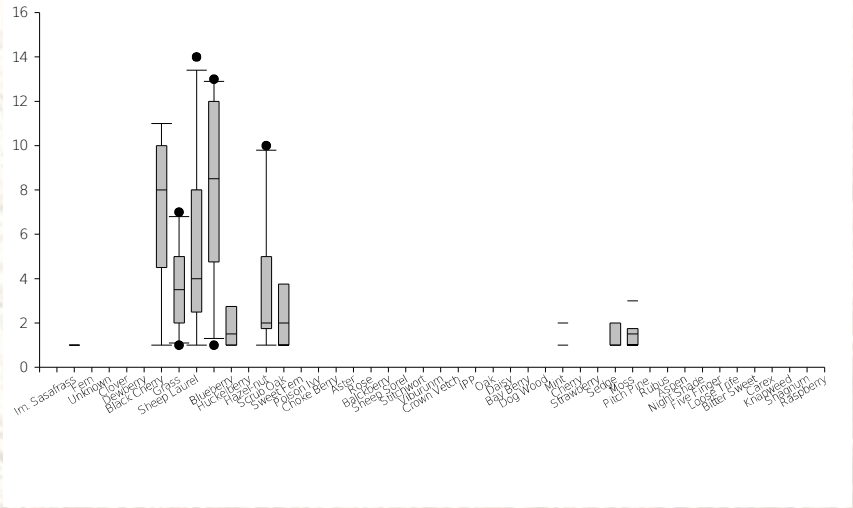


- We know, from LCTA data, understory distribution of plants for each Forest Type.



- We know, from our data, the total number and types of plants Turtles are found around.

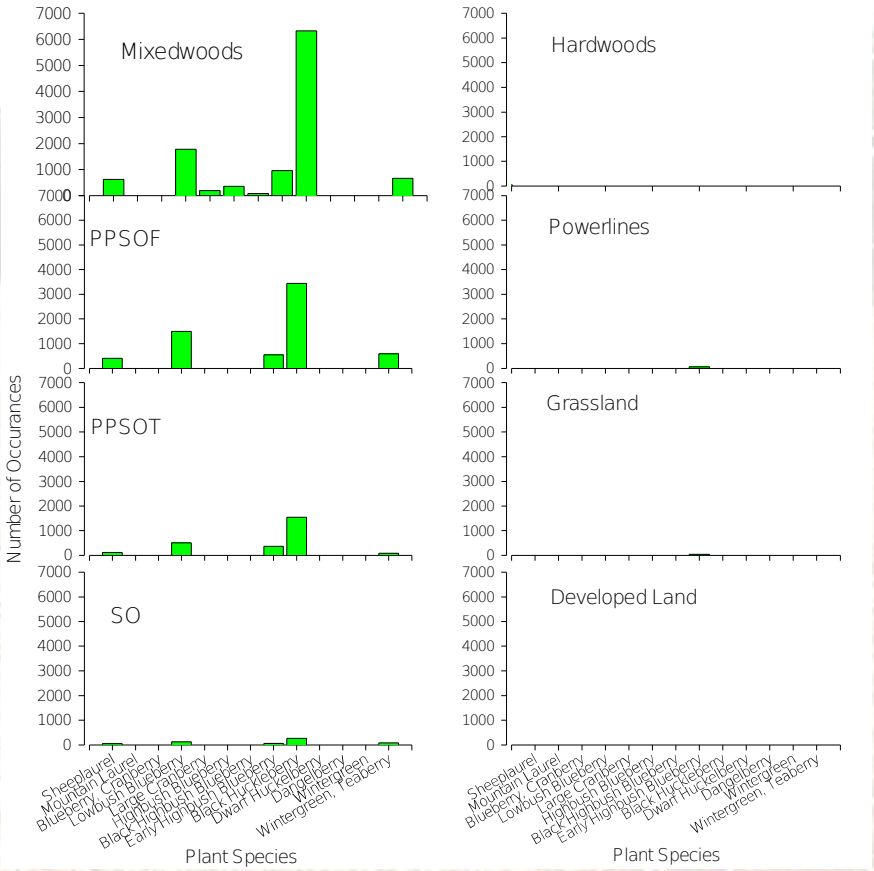




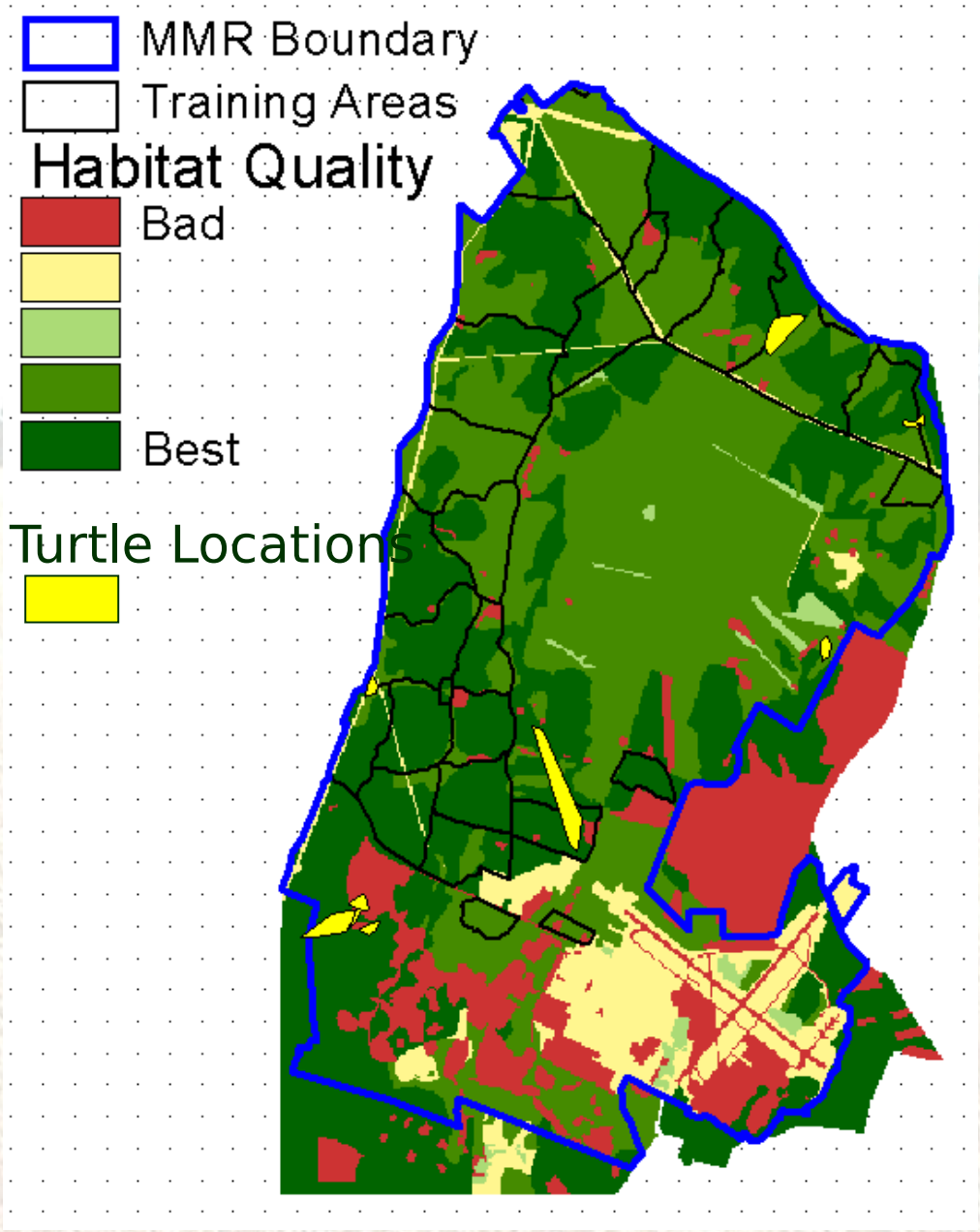
Therefore we can predict the micro habitat types that Turtles will most likely select.

Reclassified GIS Data

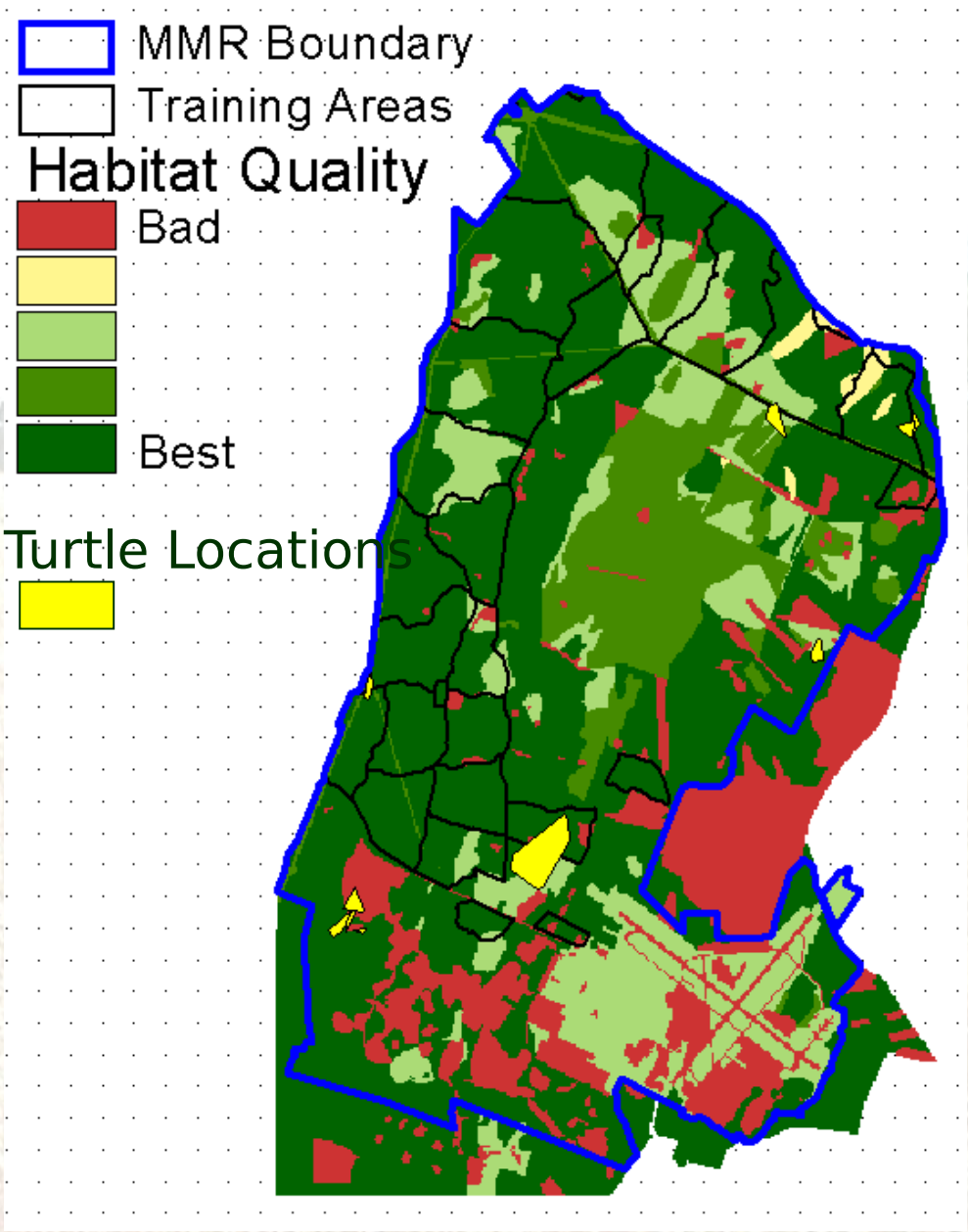
Mixed woods = 8
PP-SO Forest = 7
PP-SO Thicket = 6
Scrub Oak = 5
Hardwoods = 4
Powerlines = 3
Grassland = 2
DL, SG, CC, PP = 1



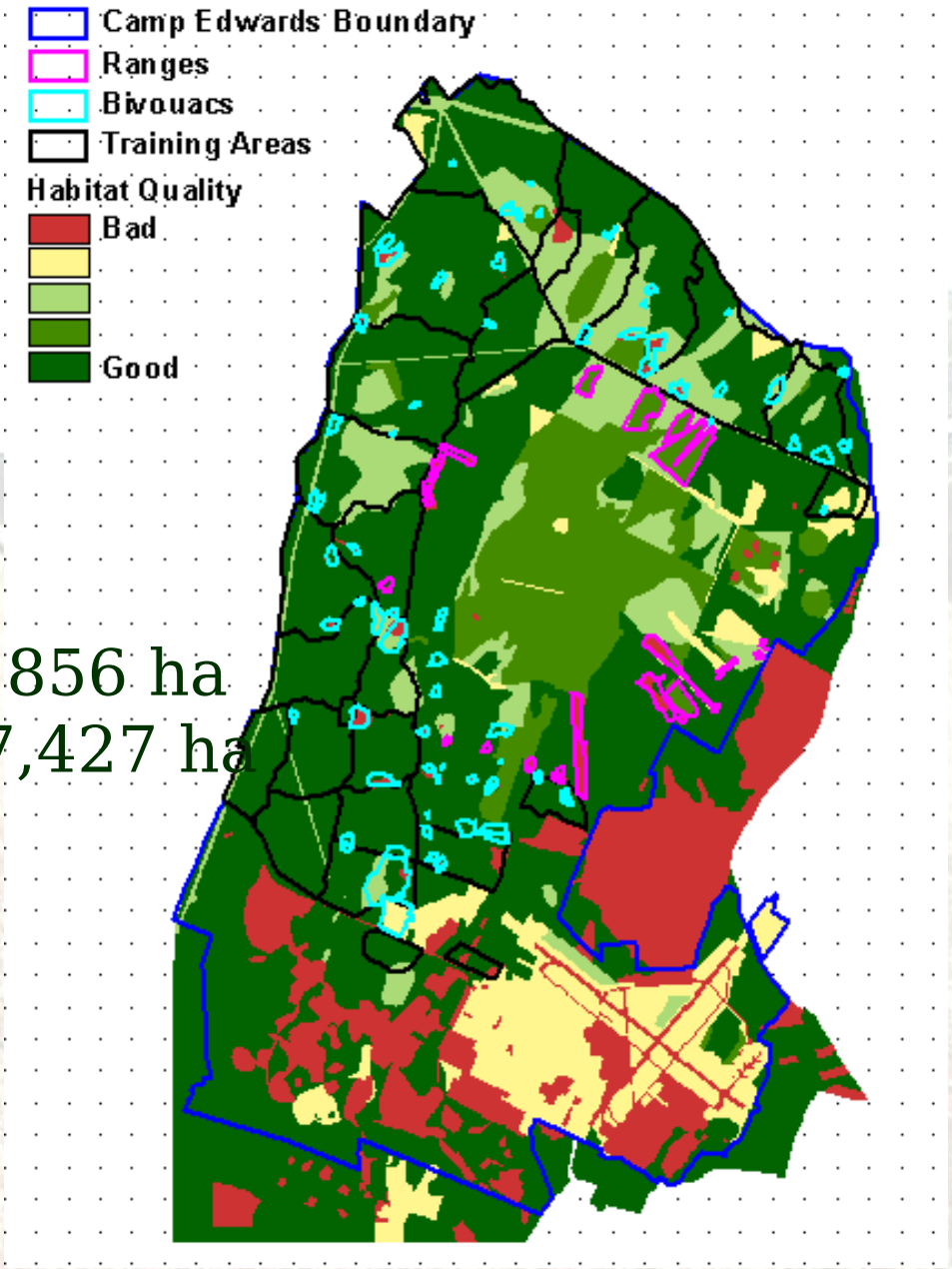
Habitat 2000



Habitat 2001



Habitat 00 & 01

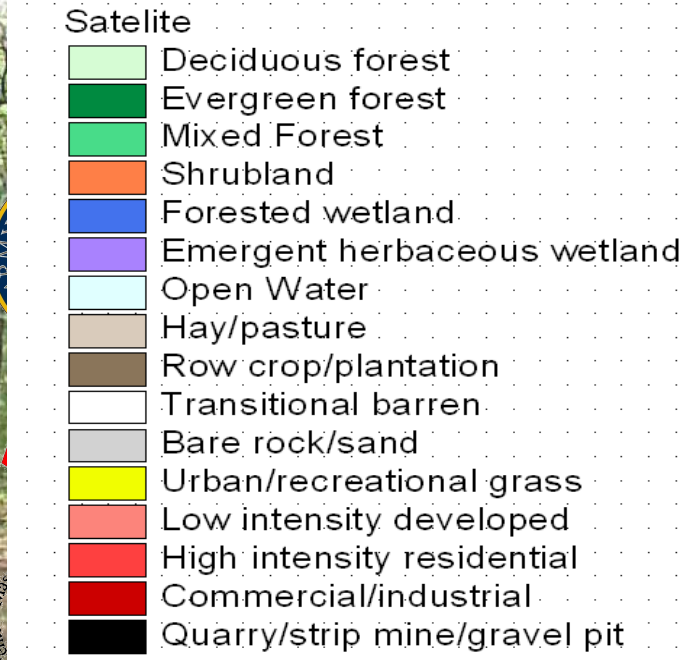


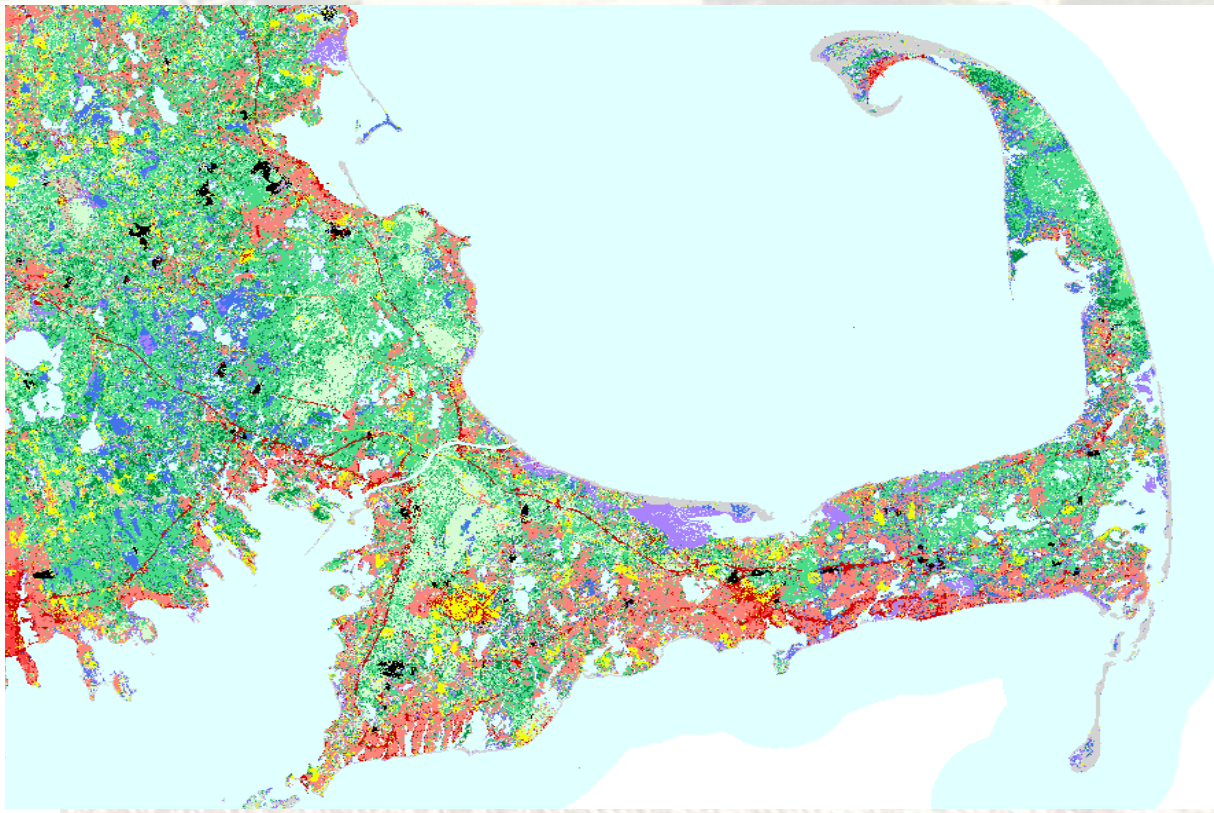
Camp Edwards

Total Area	9,856 ha
Preferred Area	7,427 ha
% of Total	75%

However, We wanted to know how Cape Cod compared to Camp Edwards

- We used 1998 LandSat Satellite Coverage Reclassified their 16 data categories into the our model.





Cape Cod Parks

Total Area 20,952 ha

Preferred Area 13,928 ha

% of Total 68%

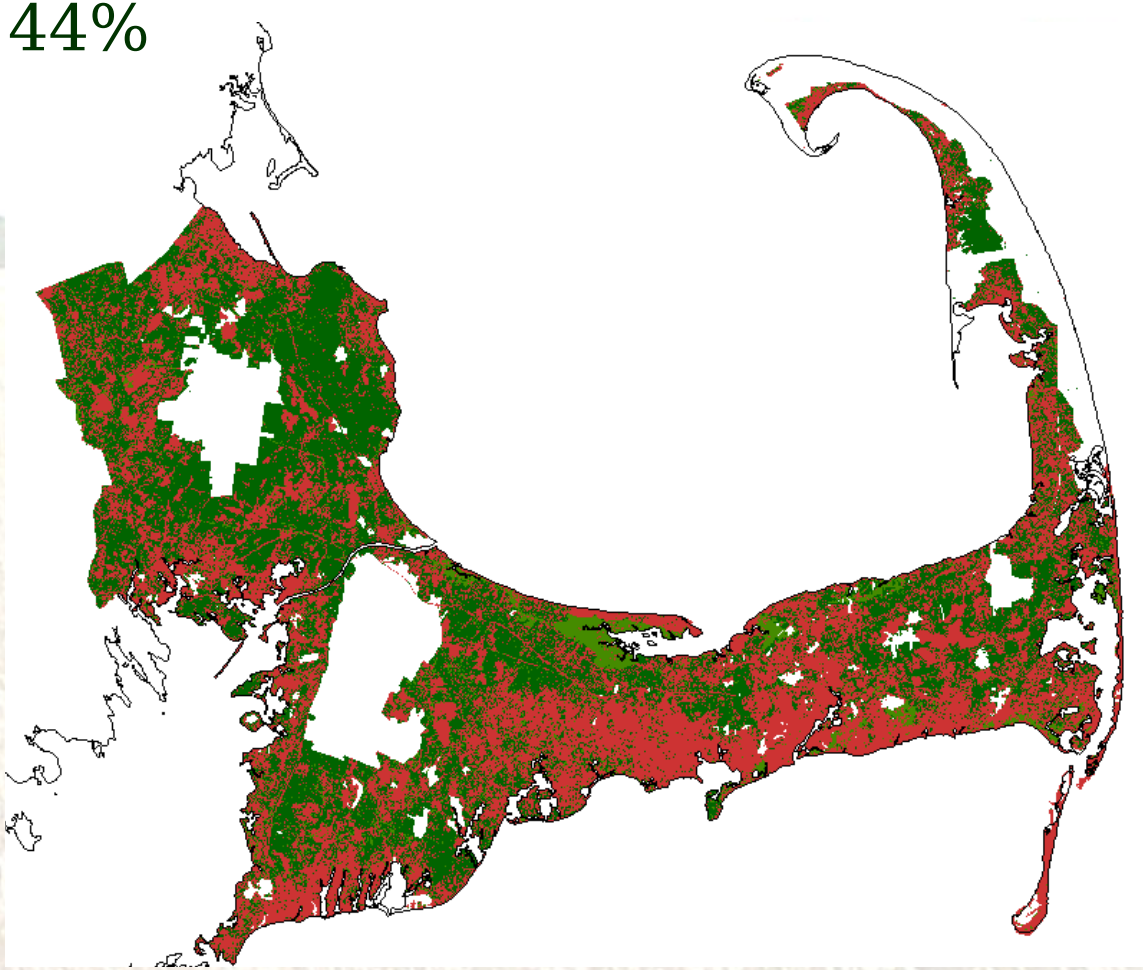
Massachusetts National Guard Environmental & Readiness Center

Cape Cod – (MMR & Parks)

Total Area 134,545 ha

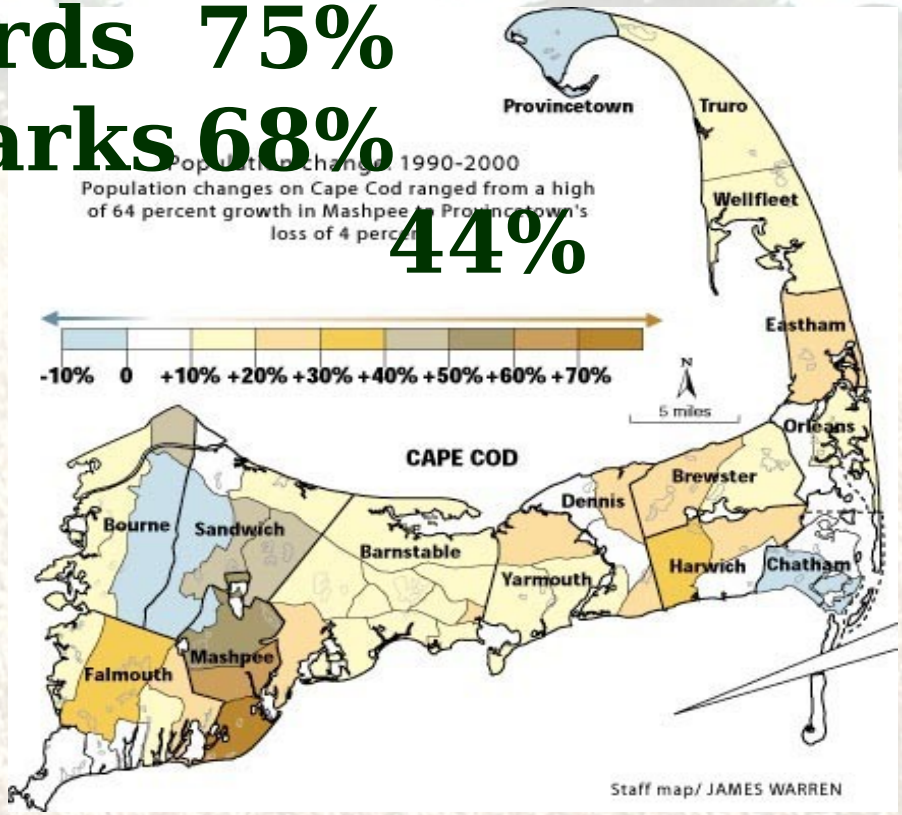
Preferred Area 61,870 ha

% of Total 44%



Habitat Conservation

Camp Edwards 75%
Cape Cod Parks 68%
Cape Cod 44%



Camp Edwards is doing better in conserving Hab
than surrounding communities.

Results of the Turtle Research on Camp Edwards
that troop training and rare species can coincide

Camp Edwards is a controlled area where we kno
in and can educate them on the importance of the
Thereby increasing the level of protection afforde
animals.

Camp Edwards is ensuring that Military Training
Readiness, and Environmental Stewardship can c
at the installation level.